

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (currently amended): A method of modeling dielectric losses in a transmission line, the method comprising:

modeling a resistance, a self-inductance, and a self-capacitance for a transmission line as a lumped element circuit having a first port and a second port, where a signal is received on the first port; and

modeling a dielectric loss as a scattering matrix connected to the second port.

Claim 2 (original): The method of claim 1, wherein the scattering matrix uses values based upon a low-loss condition wherein the intrinsic impedance of the line is unaffected by losses, whereby reflection coefficients for the first and second ports are defined to be zero if the scattering matrix is normalized to the intrinsic impedance.

Claim 3 (previously presented): The method of claim 1, wherein the scattering matrix uses values that vary with a frequency of a signal transmitted via the transmission line.

Claim 4 (previously presented): The method of claim 1, wherein the scattering matrix uses values that are related to the dielectric constant of a material in which the transmission line is embedded.

Claim 5 (original): The method of claim 1, further comprising calculating the resistance, inductance, and capacitance.

Claim 6 (original): The method of claim 1, further comprising modeling a skin effect resistance and a skin effect inductance using an R-L tank circuit connected to the second port.

Claim 7 (previously presented): The method of claim 1, further comprising modeling the dielectric losses using circuit simulation software.

Claim 8 (currently amended): A method for simulating a transmission line comprising;

determining a resistance of a transmission line;
determining a self-inductance of the transmission line;
determining a self-capacitance of the transmission line;
creating a computer model of the line as a schematic having first and second ports;

modeling the resistance as a resistor in series with an inductor that represents the self-inductance;

modeling the self-capacitance as a capacitor connected to the transmission line; and

modeling a dielectric loss as a scattering matrix connected to the second port, wherein the scattering matrix represents conductance of the transmission line across a band of frequencies.

Claim 9 (original): The method of claim 8, further comprising modeling a signal received on the first port.

Claim 10 (previously presented): The method of claim 8, wherein the scattering matrix uses values that are related to the dielectric constant of a material in which the transmission line is embedded.

Claim 11 (original): The method of claim 8, wherein the transmission line is a line on an electronic circuit board or an integrated circuit chip.

Claim 12 (previously presented): The method of claim 8, wherein the transmission line is simulated using circuit simulation software.

Claim 13 (previously presented): The method of claim 8, wherein the scattering matrix [S] is described by the equation:

$$[S] = \begin{bmatrix} 0 & \exp\left(-\frac{\pi f \sqrt{\epsilon_r} \tan \delta}{c} \cdot l\right) \\ \exp\left(-\frac{\pi f \sqrt{\epsilon_r} \tan \delta}{c} \cdot l\right) & 0 \end{bmatrix}.$$

Claim 14 (currently amended): A computer-readable medium having computer-executable instructions for performing a method for modeling transmission lines, the method comprising:

modeling a resistance, a self-inductance, and a self-capacitance for a transmission line as a lumped element circuit having a first and a second port, where a signal is received on the first port; and

modeling a dielectric loss as a scattering matrix connected to the second port.

Claim 15 (original): The medium of claim 14, wherein the scattering matrix uses values based upon a low-loss condition wherein the intrinsic impedance of the line is unaffected by losses, whereby the reflection coefficients for the first and second ports are defined to be zero if the scattering matrix is normalized to the intrinsic impedance.

Claim 16 (original): The medium of claim 14, wherein the scattering matrix uses values that vary with a frequency of the signal.

Claim 17 (previously presented): The medium of claim 14, wherein the scattering matrix uses values that are related to the dielectric constant of a material in which the transmission line is embedded.

Claim 18 (previously presented): The medium of claim 14, wherein the method further comprises calculating the resistance, inductance, and capacitance, and wherein the modeling comprise using circuit simulation software.

Claim 19 (original): The medium of claim 14, wherein the method further comprises modeling a skin effect resistance and a skin effect inductance using an R-L tank circuit connected to the second port.

Claim 20 (previously presented): The medium of claim 14, wherein modeling the dielectric loss comprises using a two-by-two matrix [S] described as:

$$[S] = \begin{bmatrix} 0 & \exp\left(-\frac{\pi f \sqrt{\epsilon_r} \tan \delta}{c} \cdot l\right) \\ \exp\left(-\frac{\pi f \sqrt{\epsilon_r} \tan \delta}{c} \cdot l\right) & 0 \end{bmatrix}.$$